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SPECIAL INSTRUCTIONS:

# The Coherent Backscattering Opposition Effect: Measurements at Very Small Phase Angles.

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We have measured the opposition surge, the non-linear increase in reflectance seen in particulate materials when observed at small phase angles. The measurements are the first ever made using the JPL long arm goniometer which permits very small phase angle measurements to be made. The samples were presented with linearly and circularly polarized monochromatic light of wavelength 0.633 microns. The phase angles measured were from 0.2 to 5 degrees. The linear and circular polarization ratios were measured in the reflected signal. The results of this investigation confirm our previous measurements which were constrained to phase angles of larger than 1 degree (Nelson, *et al.*, B.A.A.S. **24**, 943, 1992; Nelson *et al.* Proc. LPSC. **XXIV**, 1061-1062, 1993). For all of the high reflectivity materials studied, the circular polarization ratio increases as phase angle decreases in the region near zero degrees. The increase in circular polarization ratio becomes particularly large (~25%) as the phase angle decreases from 1 to 0.2 degrees. These results are consistent with the hypothesis that the opposition surge in these materials is due to the phenomenon of coherent backscattering (Hapke, **88**, 407, 1990). It had been previously thought that the reduction in the size of mutual shadows near zero phase was the cause of the opposition surge. The circular polarization ratios observed are not consistent with the shadow hiding hypothesis. This work represents one phase of research carried at Jet Propulsion Laboratory under contract with NASA.

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